



SPECTRA User Manual

Utility Node

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Chapter 0 - About this document

This document is the user manual for the Utility Node of Concept Systems Limited's integrated navigation system designed for marine geophysical survey usage (SPECTRA). SPECTRA is a modular system comprising various Nodes.

This manual describes how to use the Utility Node. Chapter 1 introduces the Node and explains how to get started with it. Subsequent chapters explain how to use the Calibration, Baseline Crossing and Coordinate Conversion utilities.

For a general overview of the operation of SPECTRA and for a description of features and conventions common to SPECTRA Nodes, see the SPECTRA User Manual - *Beginners Guide*. For a glossary of terms, see the SPECTRA User Manual - *Glossary*. For brief descriptions of each Node, detailed descriptions of the options provided by other SPECTRA Nodes, and details of how to start each Node, see the Spectra *Software Installation and Set Up* manual.

Revision history

Document Reference	Date	Notes
SPECTRA_2.0/USER/UN/1.0	1 st November 1996	First issue
SPECTRA_2.0/USER/UN/2.0	20 th May 1997	Document format and other minor errors corrected.
SPECTRA_8.x.x/USER/UN/3.0	March 2000	Calibration Utility updated. Can get Projection data from Data Server.

Document cross-reference

Document Reference	Title
SPECTRA/INSTALL	<i>Spectra Software Installation and Set Up</i>
SPECTRA/USER/BEGIN	<i>SPECTRA User Manual - Beginner's Guide</i>
SPECTRA/USER/GLOSS	<i>SPECTRA User Manual - Glossary</i>
SPECTRA/USER/DSN	<i>SPECTRA User Manual - Data Server Node</i>
SPECTRA/USER/NCN	<i>SPECTRA User Manual - Network Calculation Node</i>
SPECTRA/USER/RTCN	<i>SPECTRA User Manual - Real Time Configuration Node</i>
SPECTRA/USER/LMN	<i>SPECTRA User Manual - Line Management Node</i>
SPECTRA/USER/RN	<i>SPECTRA User Manual - Replay Node</i>
SHARED/RUNT	<i>RTN_u Hardware Installation and Operation</i>
SHARED/RTNU_OP	<i>RTNU & Closure Unit Hardware Installation and Operation</i>

Conventions used in this document

The conventions used in this, and all other SPECTRA user manuals, are those defined in the SPECTRA User Manual - *Beginner's Guide*.

Chapter 1 - Introduction

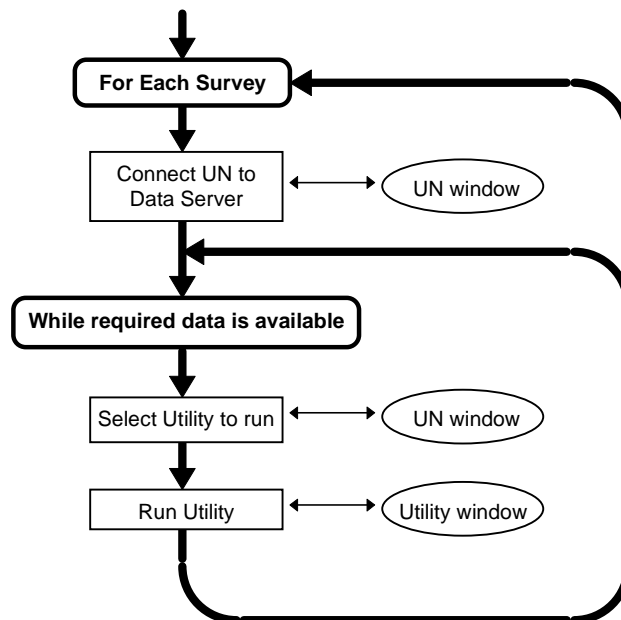
This chapter introduces the Utility Node and explains how to get started with it.

What is the Utility Node?

The SPECTRA Utility Node (UN) is used to run any of an extendible set of utilities to perform particular computations using data available from SPECTRA's Data Server.

Utility Node operational flow

The following diagram shows the process of using the Utility Node, and the relationship between this process and the Node's main windows.



Getting started

Common features

Note that some feature are common to all SPECTRA Nodes. These include:

- general use of the mouse buttons;
- status areas on a Node's main window;
- opening and saving configuration files, and exiting from the Node (via the *File* menu on a Node's main window);

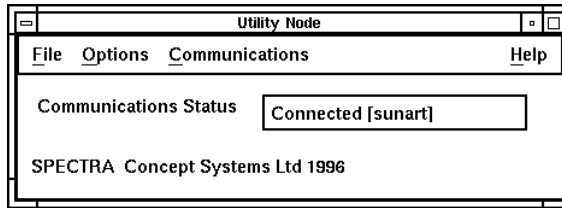
- submitting configuration changes to the Data Server (via the *Submit* button or the *File* menu on a Node's main window);
- selecting or specifying a file (for opening or saving the configuration);
- connecting to and disconnecting from the Data Server, and viewing communications errors (via the *Communications* menu);
- applying any configuration changes to the Node and exiting from the sub-window (via the *OK*, *Apply* and *Cancel* buttons or the *File* menu on sub-windows of the Node); and
- obtaining help.

Starting the Utility Node

This Node would normally be started via the Monitor Node. Details of the commands required to start this and other SPECTRA Nodes can be found in the Spectra *Software Installation and Set Up* manual.

The main window

The starting point for using the Utility Node is the Utility Node window:

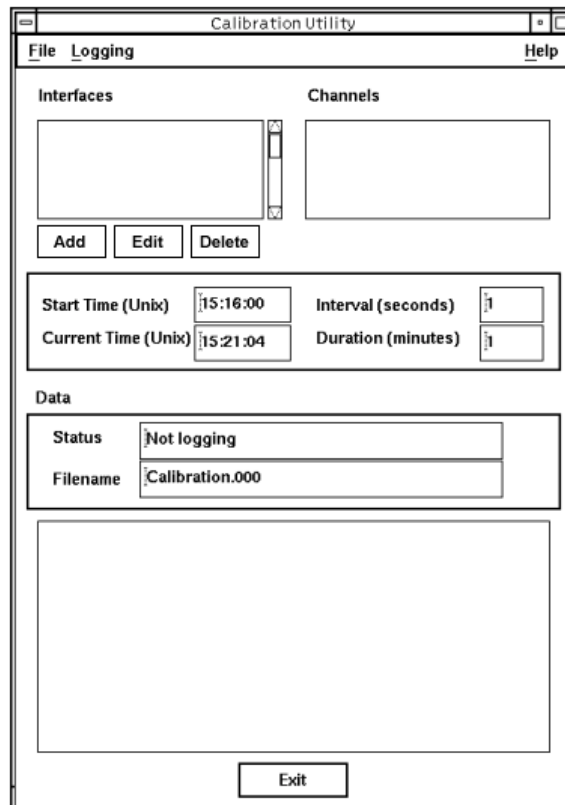


From here you can access the Calibration Utility, the baseline Crossing Utility and the Coordinate Conversion Utility. Select the required utility from the *Options* menu.

Chapter 2 - The Calibration Utility

The Calibration Utility window

When you select *Calibration* from the *Options* menu on the Utility Node window, the following is displayed:

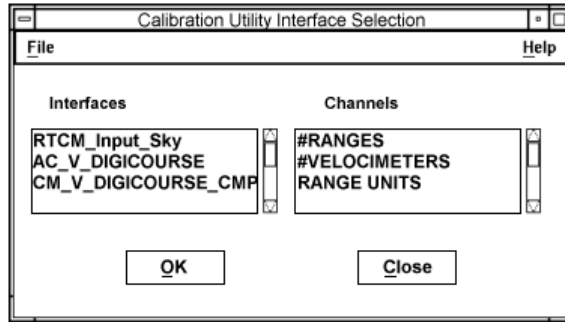


Use the Calibration Utility window to set an interval and duration, and control the logging of calibration data to file. Current or logged calibration data can be printed.

Note that data is periodically flushed to disk so that in the event of an error, you will have a partially complete set of data.

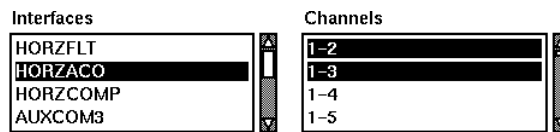
Selecting an interface

Click the *Add* button to bring up the Calibration Utility Interface Selection window:



This lets you select the interfaces and channels from which to use data.

Select an interface on which the data for calibration is being received from the *Interfaces* list box. The channels for that interface appear in the *Channels* list box where you can choose which channels to include. For example:



Click *OK* when you have finished making your selections. If you want to alter your choices, highlight the relevant interface in the Calibration window and click the *Edit* button to bring the Interface Selection window back.

Specifying logging interval and duration

Specify the interval (in seconds) at which data from the selected channels is to be logged for calibration purposes. Enter this in the *Interval (seconds)* field. The default value is 1.

Specify the duration (in minutes) for which data is to be logged. Enter this in the *Duration (minutes)* field. The default value is 1.

Changing the filename

If you wish, you can change the file name to which the data for calibration is logged. To do this, amend the default name displayed in the *Filename* field. The default file name is `Calibration.000` for the first logging of data in your Calibration Utility session, `Calibration.001` for the second, and so on. The file is normally created in the `$PN_LOG` directory (or if this does not exist, in the default directory, which will usually be the current one). It is impossible to overwrite files, and specifying an existing file name will result in the creation of a default name.

Starting logging

Start logging by selecting *Logging/Start*. Once logging is underway, you can pause it at any point (via *Logging/Pause*), continue logging after a

pause (via *Logging/Continue*) or stop the logging before the end of the specified duration (via *Logging/Finish*). The data being logged is displayed in the *Data* panel:

Data

	1-2	1-3
08:16:53	85.000000	0.000000
08:17:03	86.000000	0.000000
08:17:13	87.000000	0.000000
08:17:23	83.000000	0.000000

The logging status at any time is shown in the *Status* field, and can be:

Not logging;

Logging n of m;

Paused logging at n of m;

Continue logging; or

Finished logging at n of m

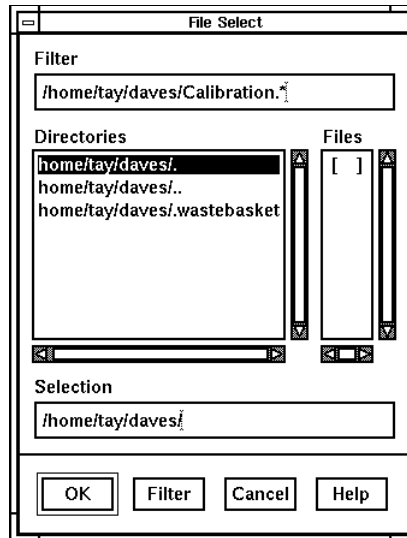
where n is the number of values for each channel so far logged, and m is the expected total number of values to be logged if logging is allowed to continue for the specified duration. Note that the *Finished* values for n and m may not be equal if you stop logging before the specified duration has elapsed.

Note that the current time and the time at which the Calibration Utility was started are displayed, for information. This time is derived from GPS data if this is available from the Data Server; if not, standard UNIX time is used. The chosen method is indicated in the Calibration Utility window.

Printing the calibration data

If you wish, you can send the currently logged calibration data to a connected printer (via *File/Print Current Data*).

You can also print from a file (via *File/Print Data File*). This option shows a file selection window on which you can specify the required path and file name:



Chapter 3 - The Baseline Crossing Utility

The Baseline Crossing window

When you select *Baseline Crossing* from the *Options* list on the Utility Node window, the following is displayed:

From here you can choose live or replayed data that has been logged via the Data Logging Node, or you can choose a Baseline Crossing logged file if data has been saved from a previous Baseline Crossing session. You can also define the stations and antenna used in the calculation, and the type of baseline crossing required. Finally, you can choose how to display the data, and start and stop logging.

Selecting input type

Select the type of *Input* you require from the pulldown menu. Choose from *Live* or *File*. If you select *Live*, the *P2/91 File* field becomes unavailable.

Selecting a file

To select a *File*, bring up the appropriate file selection window either by right clicking on the *P2/91 File* or the *Data File* field, or by using *File/Open P2/91* or *File/Open*. Select and *OK* the file you require.

Note on files:

If you select a data file, all the information needed to run the utility is automatically made available. No other part of SPECTRA is necessary to run the utility. With a P2/91 file, you will need at least the Line Management Node.

Selecting the antenna

Select the required Radio Navigation system antenna; right click on the *Antenna* field to choose. If only one antenna is defined, it will be selected automatically.

Choosing the stations

Choose the stations required. Right click on each *Station* field to show a list of available stations. For each field, choose the station you want either by double clicking on the station name or by clicking once on the name and then using *File/Select*.

Selecting baseline calculation type

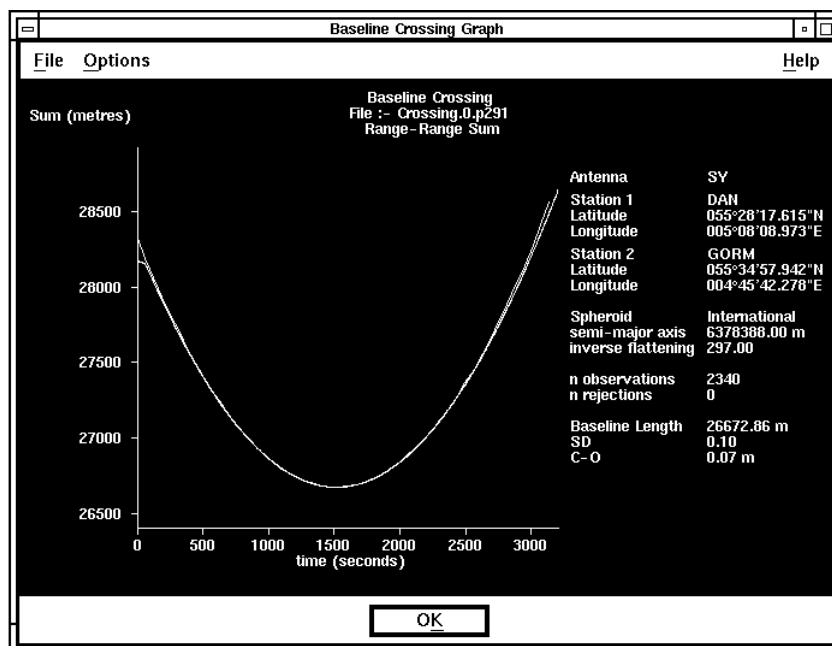
Select the type of *Baseline* calculation required from the pulldown menu. Choose from *Range-Range Sum*, *Range-Range Difference* and *Hyperbolic*.

Controlling the logging

Control the logging of baseline crossing data. From the *Options/Logging* menu, choose *Start* or *Finish* logging as required. Choose whether to enable or disable the facility to estimate C-O for each new item range by selecting the *Fit Data Online* option from the *Options* menu. A small square appears next to the option when it is enabled.

Viewing the data as a graph

From the Base Line Crossing window, choose *Display/Graph* to display the Baseline Crossing Graph window:



At the top of the graph, the name of the file from which you are reading is displayed if you selected *File* as your input type, otherwise you are told that the utility is reading *Live Data*, and the status is displayed: *Not Logging*, *Logging* or *Finished Logging*. The type of *Baseline* selected is also displayed.

Within the curve of the graph, observations are green, fitted data is yellow, and any observations that you have rejected (see [Viewing the data as a table](#)) will appear in red.

Displaying information

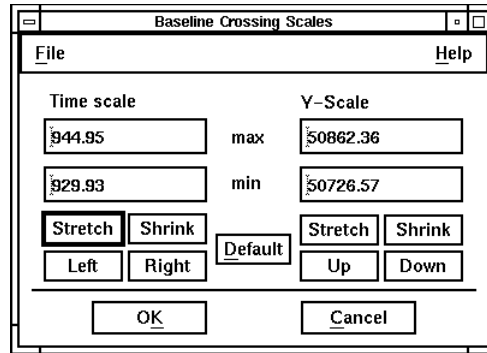
You can choose whether or not to display information about the stations and the GRS by using *Options/Display Stations* and *Options/Display GRS*, respectively. Select the station coordinate type, using *Options/Coordinate Display Type* to choose between *Geographical* (Latitude and Longitude) and *Map* (Northings and Eastings).

Observations, rejections, Baseline Length, SD and C-O are always displayed. Note that if using input from a file, the C-O data is completed, whereas live input, if fitting on-line, gives readings that are based on the data received so far, which will eventually become complete. (If not fitting on-line, this data will be unavailable until completed.)

Setting the graph scales

Set up the graph scales, choosing either default scales or defining the scales yourself. If you choose default values (using *Options/Default Scales*), the maximum and minimum values will be set to the default values for the individual data set.

If you wish to define the scales yourself, select *Options/Define Scales* or right click on the graph to display the Baseline Crossing Scales window:

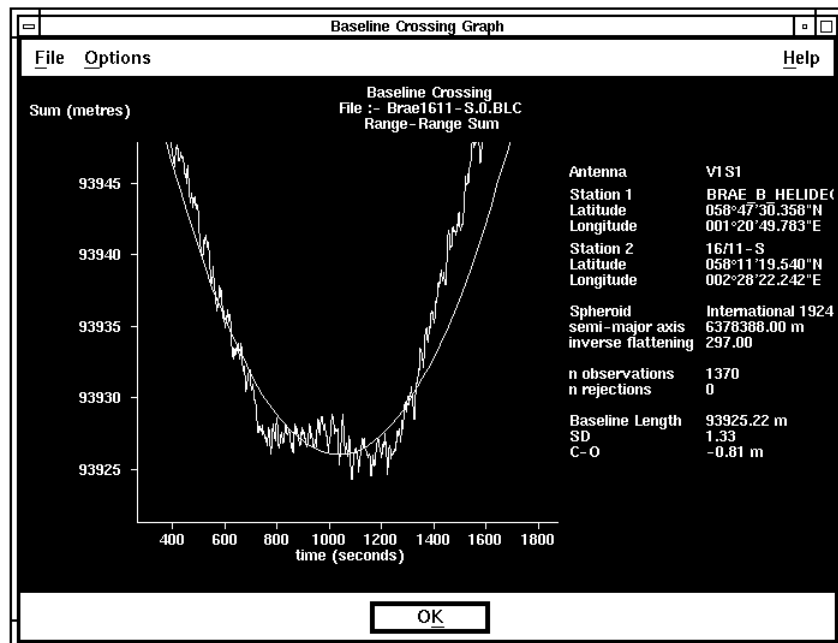


Changes to the scales made by typing in the number fields are only effected when you apply them.

Changes made to the scales by using the buttons for shrinking or stretching are effected immediately. To return to default values, select the *Default* button.

Zooming in on the graph

You can zoom in to show an area of the graph in more detail. Left click on one corner of the desired area and hold the button down, then drag the mouse to the diagonally opposite corner and release the button. The graph will change to contain only the ranges within the box you have created:



The information displayed on the screen is the same as that on the original graph. The scales are calculated automatically, although you can adjust them if you wish.

The individual observations appear in green, the fit line in yellow, and any observations you have rejected (see [Viewing the data as a table](#) below) will appear in red.

Printing the graph

To print the graph, select *File/Print graph* from the Baseline Crossing Graph window; this sends the graph to an on-line printer. The printout will have the same scaling as that displayed on screen, and will also show station information, GRS information and details of the fitting algorithm.

Viewing the data as a table

From the Base Line Crossing window, select *Display/Table* (or alternatively, centre click on the Baseline Crossing Graph window). This will display the Baseline Crossing Observation Rejection window:

Time	PointofAyreGPortMaryGS-1	Range	Sum
0.0	25696.60	26029.55	51726.15
1.2	25692.90	26031.90	51724.80
3.4	25689.10	26033.70	51722.80
5.6	25685.35	26035.35	51720.70
7.8	25682.10	26036.70	51718.80
10.1	25677.15	26038.40	51715.55
11.2	25675.60	26038.95	51714.55
13.4	25672.45	26040.10	51712.55
14.5	25670.85	26040.80	51711.65
16.7	25667.30	26041.90	51709.20
18.9	25663.50	26043.00	51706.50
20.0	25661.45	26043.95	51705.40
20.1	25659.55	26044.75	51704.30

For live data, the table updates with every fresh observation, with the newest data at the bottom of the display. A *Pause* button is available if required (this is greyed out for data from a file). For data being read from a file, the observations appear on screen from the start of the file.

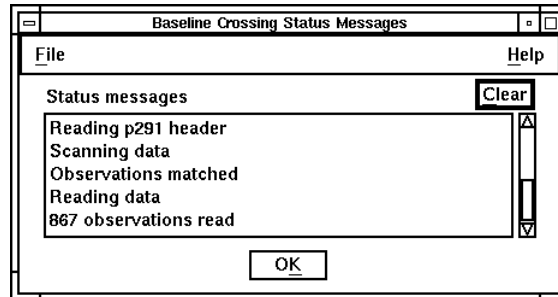
The number of observations and rejections so far are shown at the top of the screen.

Rejecting an observation

To reject an observation, click on the relevant line. Rejected observations are highlighted. To undo a rejection, click on it again, or select *Options/Clear Selection* to undo all rejections.

Viewing status messages

The *Status* field shows the current status of the utility. To see a listed history of Status messages, select *Options/Display Status Messages*. These are then shown in the Baseline Crossing Status Message window:



Select *Clear* to clear any messages.

Chapter 4 - The Coordinate Conversion Utility

This utility allows you to convert points between satellite GRS and survey GRS, and between map and geographical coordinates. This utility is free-standing and therefore it can be run whilst unconnected to the Data Server.

The Coord Convert window

From the *Options* menu on the Utility Node window select *Coordinate Conversion* to reveal the Coord Convert window.

From here you can select how points will be entered: in geographical or map coordinates, and choose to convert points from satellite to survey GRS or vice versa.

Selecting format of coordinates

Select the format in which to enter coordinates by selecting either the *Geographical* or *Map* button. Depending on your choice, the *Latitude/Longitude* fields or the *Northing/Easting* fields will be enabled.

Converting between satellite and survey GRS

Specify whether you will convert from satellite to survey GRS or vice versa, by selecting the appropriate button. Depending on your choice, the *Satellite Datum* fields or the *Survey Datum* fields will be enabled. Note that if you have opted to perform an ED50 transformation, the *Survey* → *Satellite* button will be disabled. This is because such transformations are one-way processes.

Converting coordinates

Enter the coordinates of the point you wish to convert by typing directly into the appropriate field.

Convert the coordinates by selecting *Apply*. You will now have three new pieces of information relating to your original entry:

- the coordinates of the point in the same system, different GRS;*
- the coordinates of the point in a different system, same GRS;*
- the coordinates of the point in a different system, different GRS.*

When you are finished converting points leave the Coord Convert window.

Selecting the satellite & survey datums & projection

From the Coord Convert window, select *Options/Geodetic Reference System* to elicit the UN Geodetic Reference System editor:

The screenshot shows the 'UN Geodetic Reference System' dialog box. It features a menu bar with 'File', 'Options', and 'Help'. The main area is split into three sections:

- Satellite Datum:** Datum Name (WGS 84), Spheroid Name (WGS 84), Semi-major Axis (6378137), Inverse Flattening (298.257223563).
- Survey Datum:** Datum Name (WGS 84), Spheroid Name (WGS 84), Semi-major Axis (6378137), Inverse Flattening (298.257223563).
- Datum Shift - Satellite to Survey:** X Offset (0.000) Metres, Y Offset (0.000) Metres, Z Offset (0.000) Metres, X Rotation (0.000) Seconds, Y Rotation (0.000) Seconds, Z Rotation (0.000) Seconds, Scale Difference (0.00000000) Parts Per Million.

At the bottom, there is a 'Comments' field containing 'None' and three buttons: 'OK', 'Apply', and 'Cancel'.

From here you can open an existing GRS file but may not write to such files: fields are editable but changes may not be saved.

WGS 84 is the default datum for both satellite and survey.

Viewing satellite and survey datums

Use *File/Open* to load a GRS data file. This will provide definitions of the satellite and survey datums. Note that the satellite datum is always WGS 84.

If you wish, edit any of the fields by typing directly into the field. Note that these changes cannot be saved: GRS files may only be altered via the LMN. See the SPECTRA User Manual - *Line Management Node* for details on editing these files.

Specifying the projection

Specify the projection to use in the conversion (this information is not held in the GRS file). Select *Options/Projection* to reveal the UN Projection window:

Choose the projection from the pull-down menu at the top of the window. Fields are enabled and labelled depending on your selection.

Alternatively, choose *Get Projection from Data Server* from the *Options* menu to synchronise the projection data with whatever you set up in the LMN. This option is only available when the Utility Node is connected to the Data Server. If you run the Utility Node with the `-X` command line option then this synchronisation takes place at start up.

Entering projection parameters

UTM Projections

For UTM projections, select the required hemisphere (North or South) using the pulldown menu and enter the zone number for the projection.

Other projections

For other projections, enter the latitude and longitude of the projection's origin. Alternatively, enter the Northing and Easting of the projection's origin (in current length units).

Lambert projections

For Lambert (1 and 2) projections only, enter the first parallel, in degrees. For Lambert 2 projections only, also enter the second parallel, in degrees.

RSO projections

For RSO projections only, enter the initial bearing and the skew angle, in degrees.

Scale factor

Enter the scale factor for the projection.

Viewing comments

The Comments field at the foot of the GRS Editor shows the first line of any further information that may be relevant to the GRS set-up. More information may be shown by selecting *Options/View Parameters* to display the following window:

